SOLAR PHOTOVOLTAIC INSTALLATION GUIDELINES

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- Photovoltaic Task Force
- Photovoltaic Background
- Mitigating Concerns

Photovoltaic Task Force

- Governors Request
- Stakeholders: Industry, State Agencies, Building Officials and Fire Service representatives
- August 2007 first meeting
- Meetings provided an education to both the Fire Service and PV Industry

Photovoltaic Task Force

- The Guidelines developed with safety as principal objective
- The Guidelines assembled in 7 months
- Field trips and demonstrations were provided to show PV installation and fire service roof operations

"GUIDELINE" IS NOT…

- A regulation.
  - In order for the guideline to be enforceable within a code application, the appropriate adoption procedures, process and procedures would need to be followed (in accordance with the Health and Safety Code)
  - Several agencies are using this document as policy statements within planning documents or have adopted the document as "code"

"GUIDELINE" DOES NOT…

- This guideline does not apply to non-habitable structures and solar energy systems, such as:
- Solar water heating
- Solar pool heating
- Solar space conditioning

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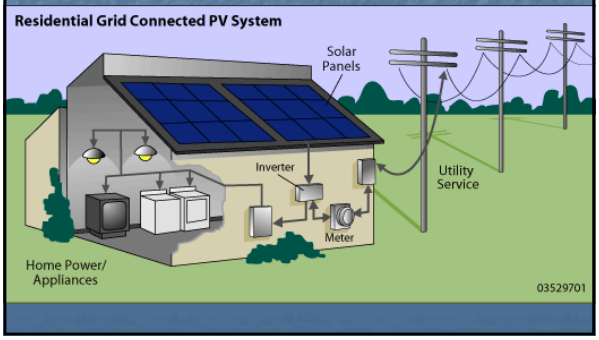
Photovoltaic Background

Most systems are connected to the electric grid and provide power to the site.

Marin Fire Station with roof mounted PV

Photovoltaic Background



Photovoltaic Background

- During the day, there is power in the conduit between the PV modules and the direct current disconnect.
- Systems can produce up to 8 amps per string and up to 600 volts of electricity which varies by installation.

Photovoltaic Background

Power output is highest on a bright day with low ambient temperatures and drops as the modules heat up (such as on a very hot day).

Photovoltaic Background

Different Types of Solar Systems

- Integrated in a building's roof surface
- On a rack with a space above the roof surface
- On a freestanding structure but not on the habitable structure (such as a trellis or other free-standing support structure).

Photovoltaic Background

Modules are located in a manner to provide the best access to sunlight.

CONTENTS

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Mitigating Concerns

Fire Service Concern:
Identification of PV system and components

Mitigation:
Provide Marking

Mitigating Concerns

Marking:

- PV systems must be marked.
- Marking is needed to provide emergency responders with appropriate warning and guidance with respect to working around and isolating the solar electric system

Mitigating Concerns

Marking: Main Service Disconnect Content and Format

CAUTION: SOLAR ELECTRIC SYSTEM

Mitigating Concerns

Marking:

- Marking should be placed on all interior and exterior direct current conduit, raceways, enclosures, and cable assemblies, every 10 feet, at turns and above and/or below penetrations and all direct current combiner and junction boxes.

Mitigating Concerns

Fire Service Concern:
Access to Roof
& Ventilation

Mitigation:
Identify Access
Pathways and
Smoke Ventilation

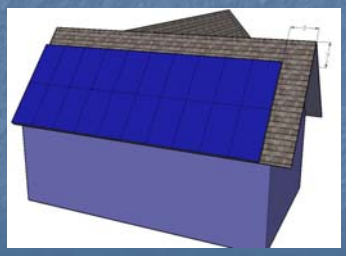
Mitigating Concerns

Access, Pathways and Smoke Ventilation

- Access and spacing requirements are important to:
- Ensure access to the roof
- Provide pathways to specific areas of the roof
- Provide for smoke ventilation opportunities area
- Provide emergency egress from the roof

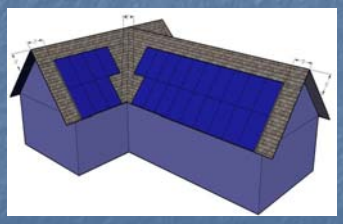
Mitigating Concerns

Access, Pathways and Smoke Ventilation



Mitigating Concerns

Access, Pathways and Smoke Ventilation



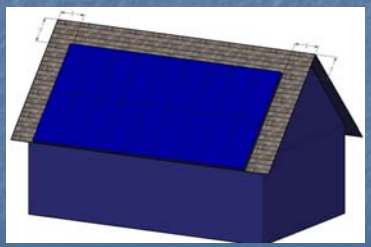
Mitigating Concerns

Access, Pathways and Smoke Ventilation

- Local jurisdictions may create exceptions where access, pathway or ventilation requirements are reduced due to:
- Proximity and type of adjacent exposures
- Alternative access opportunities (as from adjoining roofs)
- Ground level access to the roof area in question

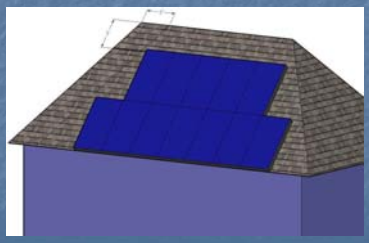
Mitigating Concerns

Residential Systems- Single & Two Unit Dwellings



Mitigating Concerns

Residential Access & Pathways



Mitigating Concerns

Commercial Buildings & Residential (3 or more units)

Mitigating Concerns

Commercial Buildings & Residential (3 or more units)

- A minimum six foot (6') wide clear perimeter around the edges of the roof.
- Exception: If either axis of the building is 250 feet or less, there should be a minimum four feet (4') wide clear perimeter around the edges of the roof.

Mitigating Concerns

Commercial Buildings & Residential (3 or more units)

Capitol East End Building, Department of Public Health

Mitigating Concerns

Fire Service Concern:

Location of Direct Current Conductors

Mitigation:

Locate conductors in predictable areas of the roof

Mitigating Concerns

Location of DC Conductors

- Conduit runs between sub arrays and to direct current combiner boxes should use design guidelines that minimize total amount of conduit on the roof by taking the shortest path from the array to the direct current combiner box. The direct current combiner boxes are to be located such that conduit runs are minimized in the pathways between arrays.

Mitigating Concerns

Ground Mounted Photovoltaic Arrays

- Setback requirements do not apply to ground-mounted, freestanding photovoltaic arrays. A clear brush area of ten feet (10') is required for ground mounted photovoltaic arrays.

SUMMARY

The "Guidelines" bridge the divide between the solar electric industry and the concerns of the fire service.

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